

ABSTRACT

An underfill material for attaching and underfilling a semiconductor component on a substrate includes a polymer base material, and electrically conductive particles in the polymer base material. The particles are configured to melt and rigidify bonded electrical connections between solder terminal contacts on the component and substrate contacts on the substrate. A size and concentration of the particles is selected to prevent electrical conductivity in X and Y directions. A method for attaching and underfilling the component on the substrate includes the steps of depositing the underfill material on the substrate or the component, placing the terminal contacts in contact with the substrate contacts while the underfill material is in a viscous or B-stage condition, bonding the terminal contacts to the substrate contacts to form the connections, and then curing the underfill material to form an underfill layer. During the bonding step at least some of the conductive particles melt and form solder layers on the substrate contacts.